



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,992	01/17/2002	Hitoshi Ohashi	020052	5363

23850 7590 09/26/2006

ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER

TALBOT, BRIAN K

ART UNIT PAPER NUMBER

1762

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/047,992	OHASHI ET AL.	
	Examiner	Art Unit	
	Brian K. Talbot	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1,7,8,11,17,18 and 51-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,7,8,11,17,18 and 51-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1762

1. The amendment filed 7/10/06 has been considered and entered. Claims 1,7,8,11,17,18 and 51-56 remain in the application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. Claims 1 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1 and 11, the claims recite a “first” molten metal, however, the claims do not recite a “second” molten metal and hence the term is not further limiting. Furthermore, the term “said molten metal” lacks antecedent basis as the previous recitation of this term is recite “first molten metal”. The Examiner suggests deleting the term first to overcome this rejection.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

Art Unit: 1762

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Rejections - 35 USC § 103

5. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711).

Sterett et al. (5,746,844) teaches a method and apparatus for creating a three dimensional article using a layer-by-layer deposition of molten metal and annealing. The molten metal is applied by depositing the droplets in a predetermined pattern and rate (abstract).

Sterett et al. (5,746,844) fails to teach measuring and comparing data calculated by a monitoring device to control the deposited material.

Kudoh et al. (4,656,048) teaches a method of forming thick film circuit patterns with a sufficiently wide and uniform strip. The monitoring system measures and controls the distance of the nozzle from the substrate and compares that to a set value and performs and necessary changes to maintain the desired value (col. 2, lines 30-40, col. 3, line 55 – col. 4, line 35).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Sterett et al. (5,746,844) deposition process by incorporating a measuring/control system as evidenced by Kudoh et al. (4,656,048) to produce the desired circuit pattern.

Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) fail to disclosed the molten metal grains overlapping one another.

Tseng et al. (6,309,711) teaches a method of manufacturing a three-dimensional object whereby molten metal is jetted toward a substrate whereby the metal deposits are overlapping (abstract and Fig. 2).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Sterett et al. (5,746,844) in combination with Kudoh et al. (4,656,048) process by applying the molten metal material to be in overlapping fashion as evidenced by Tseng et al. (6,309,711) with the expectation of achieving the similar results, i.e. a conductive circuit.

Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711).

Orme-Marmerelis et al. (6,520,402) teaches a high speed direct writing with metallic microspheres. Small droplets of molten metal are generated toward a substrate to form conductive traces (abstract).

JP 10-226,803 teaches a three dimensional body formed by various kinds of materials. Molten metal is spouted from a nozzle (10) to form droplets (20) that are applied to a substrate to form electric circuits (abstract).

Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 fail to teach measuring and comparing data calculated by a monitoring device to control the deposited material.

Art Unit: 1762

Features described concerning Kudoh et al. (4,656,048) above are incorporated here.

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 deposition process by incorporating a measuring/control system as evidenced by Kudoh et al. (4,656,048) to produce the desired circuit pattern.

Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) fail to disclosed the molten metal grains overlapping one another.

Tseng et al. (6,309,711) teaches a method of manufacturing a three-dimensional object whereby molten metal is jetted toward a substrate whereby the metal deposits are overlapping (abstract and Fig. 2).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) process by applying the molten metal material to be in overlapping fashion as evidenced by Tseng et al. (6,309,711) with the expectation of achieving the similar results, i.e. a conductive circuit.

Claims 7,8,17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) further in combination with Pan (6,501,663).

Features described above concerning Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) are incorporated here.

Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) fail to specifically teach forming an insulating layer atop the molten layer.

Pan (6,501,663) teaches a three dimensional interconnect whereby an interconnect is covered with an insulator layer to protect the interconnect (abstract and Figs 5-7).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) by incorporating an insulator layer atop the molten metal circuit layer as evidenced by Pan (6,501,663) with the expectation of achieving a multilayered structure or a protective layer for the circuitry.

Claims 51-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) still further in combination with JP 11-040937.

Features described above concerning references Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844), JP 10-226,803, Kudoh et al. (4,656,048) and Tseng et al. (6,309,711) are incorporated here.

Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) fail to specifically teach using compressed air for jetting the molten metal and using a mask to deposit the molten metal on a desired location of the substrate.

JP 11-040937 teaches injecting compressed gas in a pot of molten solder to jet the solder through a mask and onto a substrate (abstract).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Orme-Marmerelis et al. (6,520,402), Sterett et al. (5,746,844) or JP 10-226,803 in combination with Kudoh et al. (4,656,048) further in combination with Tseng et al. (6,309,711) process by incorporating a compressed gas to aid in the jetting of molten metal as well as the use of a mask to provide a desired pattern as evidenced by JP 11-040937.

While the Examiner acknowledges the fact that JP 11-040937 teaches molten metal whereas the instant claims are directed toward a molten metal for circuitry, it is the Examiner's position that the process disclosed is not limited to the material utilized. In fact, one skilled in the art at the time the invention was made would have had a reasonable expectation of achieving similar results with any molten "material".

Response to Amendment

6. Applicant's arguments filed 7/10/06 have been fully considered but they are not persuasive.

Applicant argued that none of the cited references disclose the following steps and features recited in claims 1 and 11, as amended:

- (a) a data is associated with a reference Coordinate system provided in the machine, and the data includes coordinates of points for determining arrangement of the electric circuit, a distance between any two of the points adjacent each other, and a cross-sectional area of the electric circuit extended between the two points;
- (b) the step of converting the data to a second set of data associated with the reference coordinate system provided in a construction member and the step of depositing the molten metal on a surface of the construction member to form the electric circuit on the construction member based on the second set of data;
- (c) the deposited metal grains can overlap one another such that the electric circuit has the cross-sectional area stored in the second set of data between the two points
- (d) the molten metal is jetted from a nozzle and the nozzle has X, Y, Z axes perpendicular to each other, the nozzle moving along each of the X, Y, Z axes, the nozzle moving along in a circumferential direction around each of the X axis and the Y axis.

The Examiner disagrees and provides the following explanations for each section above:

(a) The data includes coordinates of points for determining arrangement of the electric circuit is taught by Kudoh et al. (4,656,048) as detailed above. Also Sterett et al. (5,746,844) teaches a planning system whereby the deposition is determined (col. 8, lines 40-50).

(b) The step of measuring and comparing data calculated by a monitoring device to control the deposited material is taught by Kudoh et al. (4,656,048) as detailed above.

(c) The step whereby molten metal is jetted toward a substrate whereby the metal deposits are overlapping is taught by Tseng et al. (6,309,711) as detailed above.

(d) The step of the nozzle moving in the X,Y and Z direction is taught by Sterett et al. (5,746,844) (col. 8, lines 30-40 and Figs. 4 and 5).

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian K. Talbot whose telephone number is (571) 272-1428. The examiner can normally be reached on Monday-Friday 6AM-3PM.

Art Unit: 1762

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

 9/19/06
Brian K Talbot
Primary Examiner
Art Unit 1762

BKT